

Chemical-Mechanical Planarization Using Ozone

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ABSTRACT

5 The present invention relates to the use of ozone (O_3) as a reagent in chemical
mechanical planarization either in aqueous solution or as a gas directly impinging on the
surface to be planarized. An aqueous solution containing ozone may optionally contain
abrasive particles and/or additional CMP reagents co-dissolved with the ozone including
10 carbonate and bicarbonate anions, and organic acids such as formic, oxalic, acetic and
glycol. Abrasives that may be added include alumina, silica, spinel, ceria, zirconia.
Typical concentrations of ozone aqueous solution are in the range from approximately 1
part-per-million up to saturation. Ammonium salts, particularly ammonium carbonate
facilitate planarization in cooperation with ozone-containing aqueous solution. Low k
15 dielectric materials, organic as well as inorganic, and difficult to oxidize metals can be
planarized with ozone reagents pursuant to the present invention.